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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/982,305	10/17/2001	Hidetoshi Ohnuma	S01P1510US00	7853
33448	7590	06/14/2004	EXAMINER	
ROBERT J. DEPKE LEWIS T. STEADMAN HOLLAND & KNIGHT LLC 131 SOUTH DEARBORN 30TH FLOOR CHICAGO, IL 60603			MOHAMEDULLA, SALEHA R	
			ART UNIT	PAPER NUMBER
			1756	
DATE MAILED: 06/14/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/982,305

Applicant(s)

OHNUMA, HIDETOSHI

Examiner

Saleha R. Mohamedulla

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 May 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 6-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 October 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 121603.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

Claims 1-4 and 6-14 are pending. The 35 U.S.C. 112, second paragraph rejection of claim 6 is withdrawn in view of Applicant's amendments. The 35 U.S.C. 103(a) as being unpatentable over US# 5,707,765 to Chen in view of US# 5,895,736 to Nakajima is withdrawn in view of Applicant's amendments.

### ***Drawings***

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference character(s) mentioned in the description: 8x, 31, 35, and 4.
4. Corrected drawing sheets are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.
2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: 6A, 37 and 14. Corrected drawing sheets, or amendment to the specification to add the reference character(s) in the description, are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The

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replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

3. The disclosure is objected to because of the following informalities: on page 17, line 8, it appears "□CD" should be changed to "ΔCD".

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 11-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claim 11 recites the limitation "the correction grid value" in line 2. There is insufficient antecedent basis for this limitation in the claim. Correction is required.

7. Claim 11 recites the limitation "the correction table" in line 3. There is insufficient antecedent basis for this limitation in the claim. Correction is required.

8. Claim 12 recites the limitation "the correction grid value" in line 2. There is insufficient antecedent basis for this limitation in the claim. Correction is required.

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9. Claim 12 recites the limitation "the correction table" in line 3. There is insufficient antecedent basis for this limitation in the claim. Correction is required.
10. Claim 13 recites the limitation "the measured value" in line 3. There is insufficient antecedent basis for this limitation in the claim. Correction is required.
11. Claim 13 recites the limitation "the correction table" in line 4. There is insufficient antecedent basis for this limitation in the claim. Correction is required.
12. Claim 14 recites the limitation "the measured value" in line 3. There is insufficient antecedent basis for this limitation in the claim. Correction is required.
13. Claim 14 recites the limitation "the correction table" in line 4. There is insufficient antecedent basis for this limitation in the claim. Correction is required.

***Claim Rejections - 35 USC § 102***

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

15. Claims 1, 3, 4, 6-8, 10, 12 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by US# 5,707,765 to Chen.

Chen teaches a photolithography mask and method of making the same. The mask utilizes serifs to increase the correspondence between an actual circuit design and the final circuit pattern on a semiconductor wafer. The mask uses a plurality of serifs having a size determined by a resolution limit of the optical exposure tool used during the fabrication process.

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The serifs are positioned on the corner regions of the mask such that a portion of surface area for each of the serifs overlaps the corner regions of the mask. The size of the serifs is about one-third the resolution limit of said optical exposure tool (Abstract).

Because Chen teaches that the serifs increase correspondence between an actual circuit design and the final circuit pattern on the wafer, Chen teaches that mask correction units (serifs) are corrected based on a comparison of the mask correction units with respect to actual measured variation of a manufactured structure (final circuit pattern on the wafer) from a desired structure (actual circuit design). Because Chen teaches implementing the serifs on the mask, Chen teaches that the mask correction units are established. Chen also teaches that photoresist patterns on the wafer have rounded ends. Chen teaches using serifs to elongate the rounded ends on the final circuit pattern on the wafer (col. 2, lines 5-40). Therefore, Chen teaches that actual length measurements are used to revise the serifs or mask correction units.

Chen also teaches claims 3, 4, 6, 8, 10, 12 and 14 because these claims are product by process claims. These claims are only limited by the structural features recited in the claims. The only structural feature recited is a photomask. The method limitations do not limit the photomask itself. Chen teaches a photomask and therefore, teaches these claims.

### ***Claim Rejections - 35 USC § 103***

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. Claims 2, 9, 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over US# 5,707,765 to Chen in view of US# 6,077,310 to Yamamoto et al.

Chen teaches the limitations discussed above in paragraphs 14 and 15. Chen does not specifically teach the use of a correction grid and a correction table, or correcting parameter settings for lithographic equipment, or that . Yamamoto teaches pattern data that is an object of correction that is divided into an area on which correction is made using correction values that have been obtained in advance for patterns and their respective layouts and an area on which correction is made on the basis of correction valued calculated by a simulator (Abstract). Therefore, Yamamoto teaches a correction grid because Yamamoto teaches dividing the pattern data. Yamamoto teaches making first correction on design data for a first area of a mask pattern using a prepared correction table containing correction values corresponding to a pattern and surrounding layout. Therefore, Yamamoto teaches a correction table. Yamamoto then teaches making a second correction on the design data for the other area of the mask pattern than the first area using correction amount calculated on the basis of simulation of an exposure process for a mask (col. 9, lines 10-15). Yamamoto teaches an apparatus or device performs the method (col. 15, lines 20-35). This device is part of the overall lithographic equipment used in an exposure process. Yamamoto teaches considering the length of the parallel sides of patterns along with the width of active gate patterns. Yamamoto teaches dimensional precision of the spacing of the patterns (col. 15, lines 29-35). Therefore, Yamamoto teaches correcting parameter settings for lithographic equipment according to an XY differential, as Yamamoto teaches considering measurements in the X and Y direction when correcting the data. Yamamoto teaches that conditions for correction. That is, if the distance between sides is less than a first threshold value

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and the ratio between length and distance is less than a second threshold value, the pattern is to be corrected (col. 16, lines 56-65). Tables 3 and 4 in columns 16 and 17 show that the measured average has to be greater than twice the absolute value of the correction unit. That is, the values for the Distance are more than twice the absolute value of the Correction Value. Because correction occurs, the correction table is revised.

The references are analogous art as they are drawn to optical proximity effect correction. It would have been obvious to one of ordinary skill in the art to use the method of Yamamoto in the method of Chen in order to reduce calculation time for proximity effect correction and improve pattern precision, which in turn increases throughput for integrated circuit production (col. 8, lines 35-35).

#### ***Response to Arguments***

18. Applicant's arguments filed May 10, 2004 have been fully considered but they are not persuasive. Applicant argues that the correction grid is initially established and then a correction table is utilized in order to more accurately effect the generation of photolithographic structures. However, this is an unclaimed aspect of the invention. Applicant also argues that modification is based upon a comparison between the existing units and actual structures manufactured during the photolithographic process. However, the limitation that the structures are manufactured during the photolithographic process is not claimed. Nonetheless, Chen teaches comparison based on the mask correction units for photomask fabrication and the measured variation of the manufactured structure from the desired structure. Applicant argues the size of the correction is determined by the resolution of the optical exposure tool and the corrected regions are positioned on the corner regions of the mask. However, the present claims do not preclude the resolution of



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the optical exposure tool from being a factor in determining the size of the correction. Also, the present claims do not preclude corrected regions from being placed only on the corner regions of the mask. Applicant's arguments with respect to Nakajima are moot in view of the withdrawal of the rejection based on Nakajima.

Therefore, Applicant's arguments are not persuasive.

***Action is Final***

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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***Conclusion***

20. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Saleha Mohamedulla whose telephone number is (571) 272-1387. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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June 14, 2004